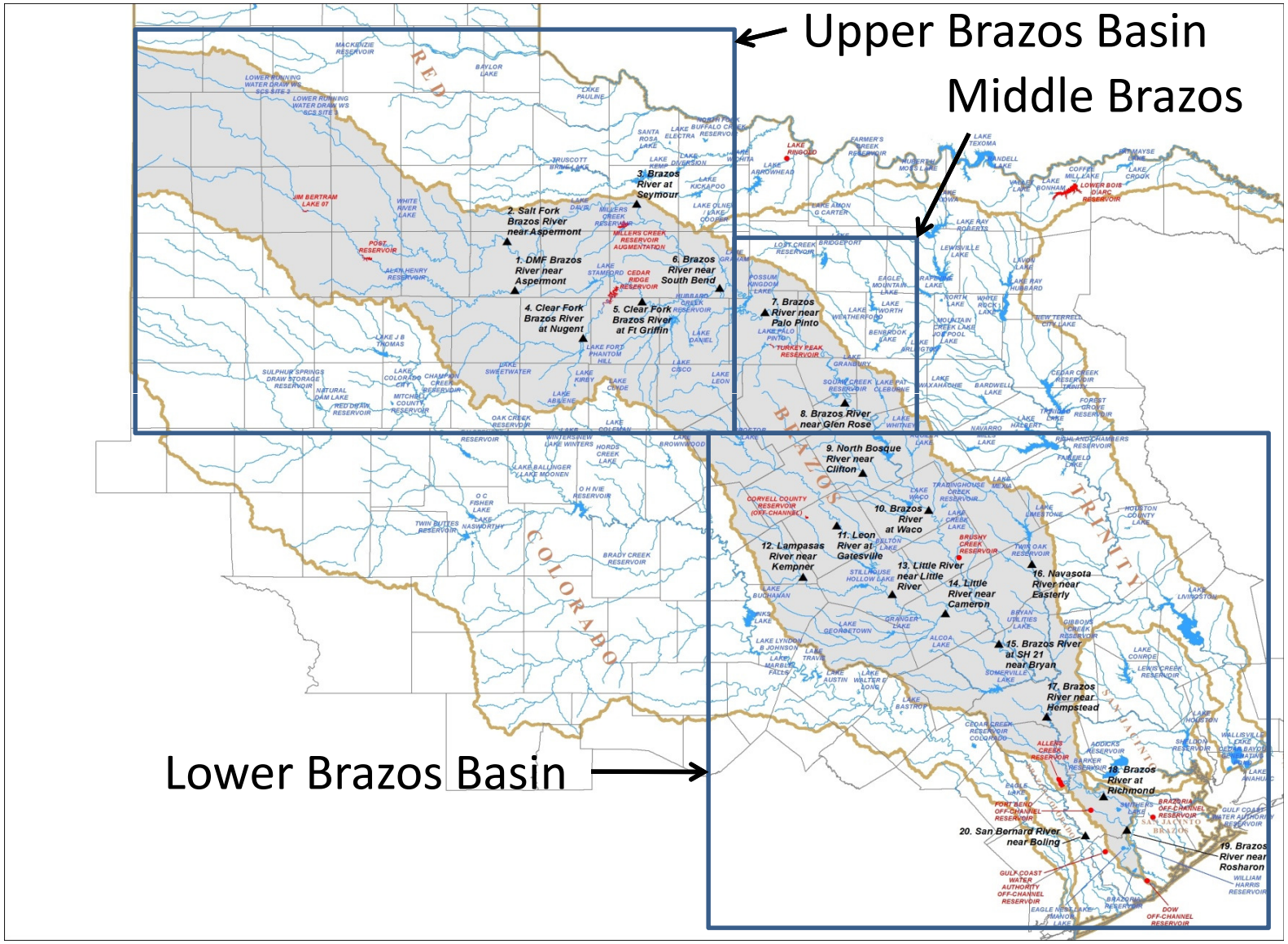
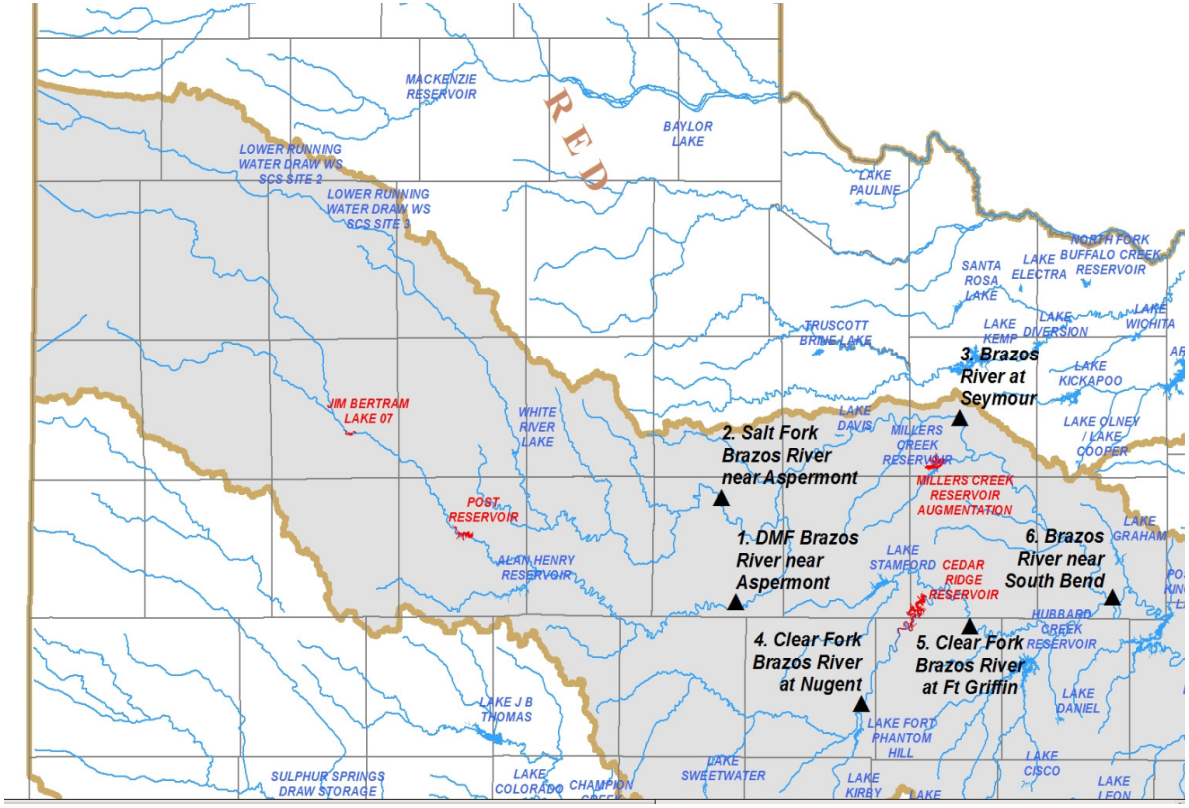
Selected Biological Issues



Upper Brazos Basin

(above Possum Kingdom)



1. Double Mountain Fork Brazos:
(downstream of Lake Alan Henry)
High fish assemblage integrity, smalleye and sharpnose shiners
Proposed Reservoirs: Lake 07, Post Reservoir (permitted in 1970)

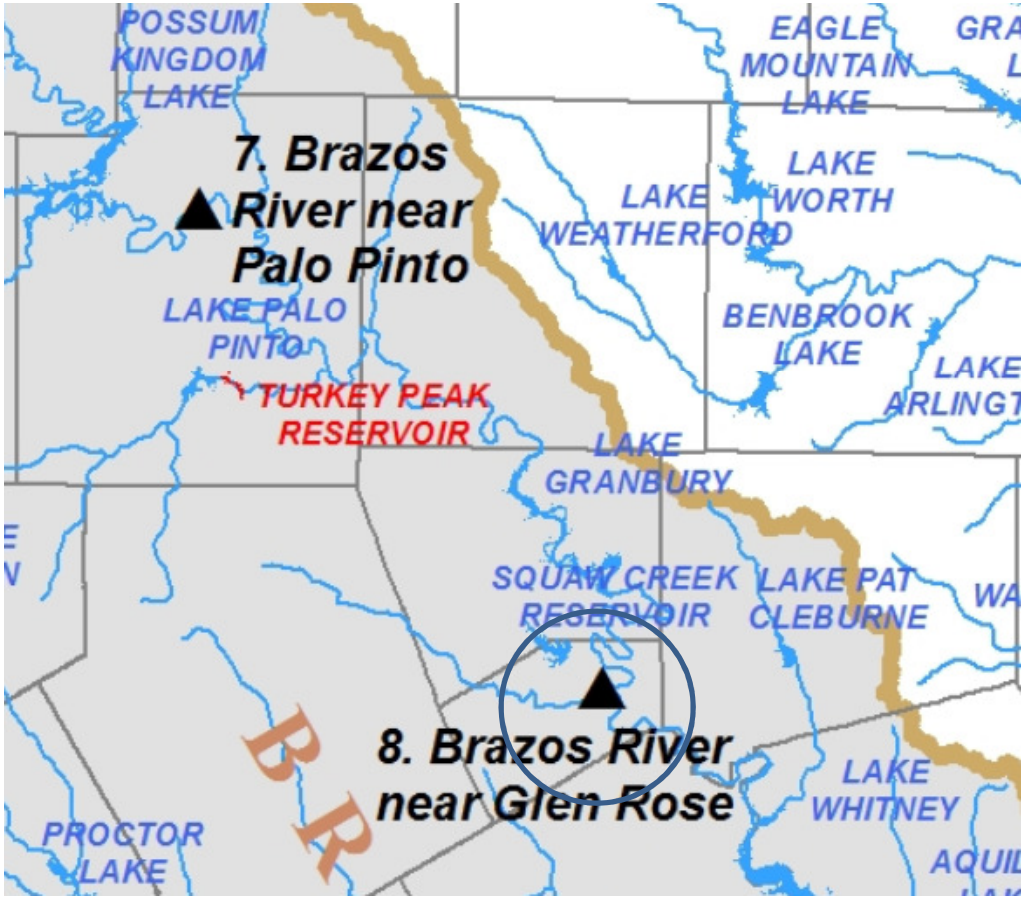
2. Salt Fork Brazos:
High fish assemblage integrity, smalleye and sharpnose shiners

3 and 6. Brazos River:
High fish assemblage integrity
smalleye and sharpnose shiners
Proposed Project: Miller's Creek Reservoir Augmentation

4 - 5. Clear Fork Brazos:
Low fish assemblage integrity
Proposed Reservoir: Cedar Ridge

Middle Brazos Basin

(Possum Kingdom to mouth of Bosque River)



Low fish assemblage integrity, community changes associated with flow alterations and high degree of habitat fragmentation

Golden algae toxic blooms

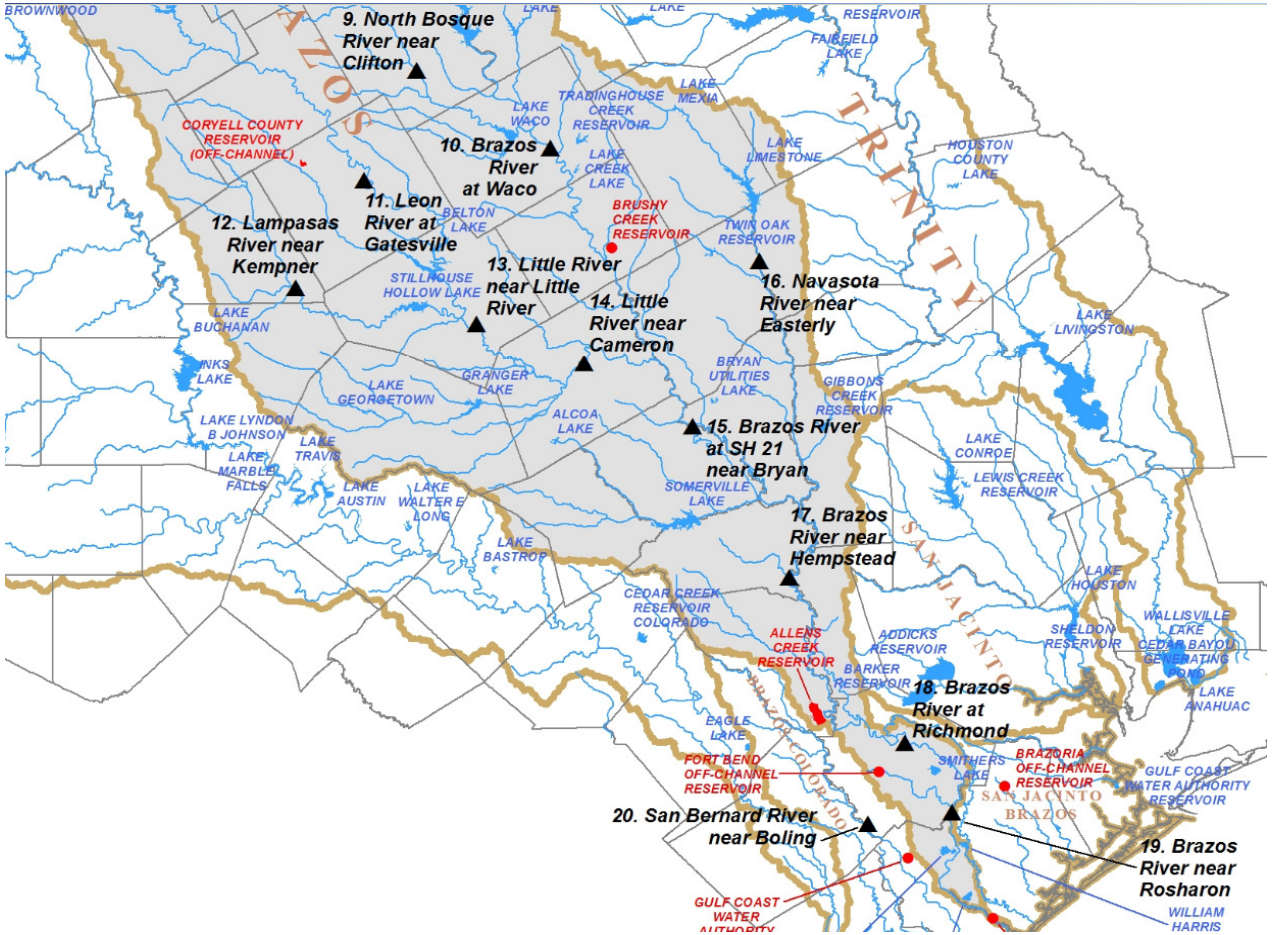
Freshwater mussel species

Proposed Reservoir:
Turkey Peak Reservoir on-channel Palo Pinto Creek

8. BRA Systems Operations (SysOps) Permit “full matrix” requirements

Lower Brazos Basin

(below the mouth of the Bosque River to the coast)



Moderate fish assemblage integrity

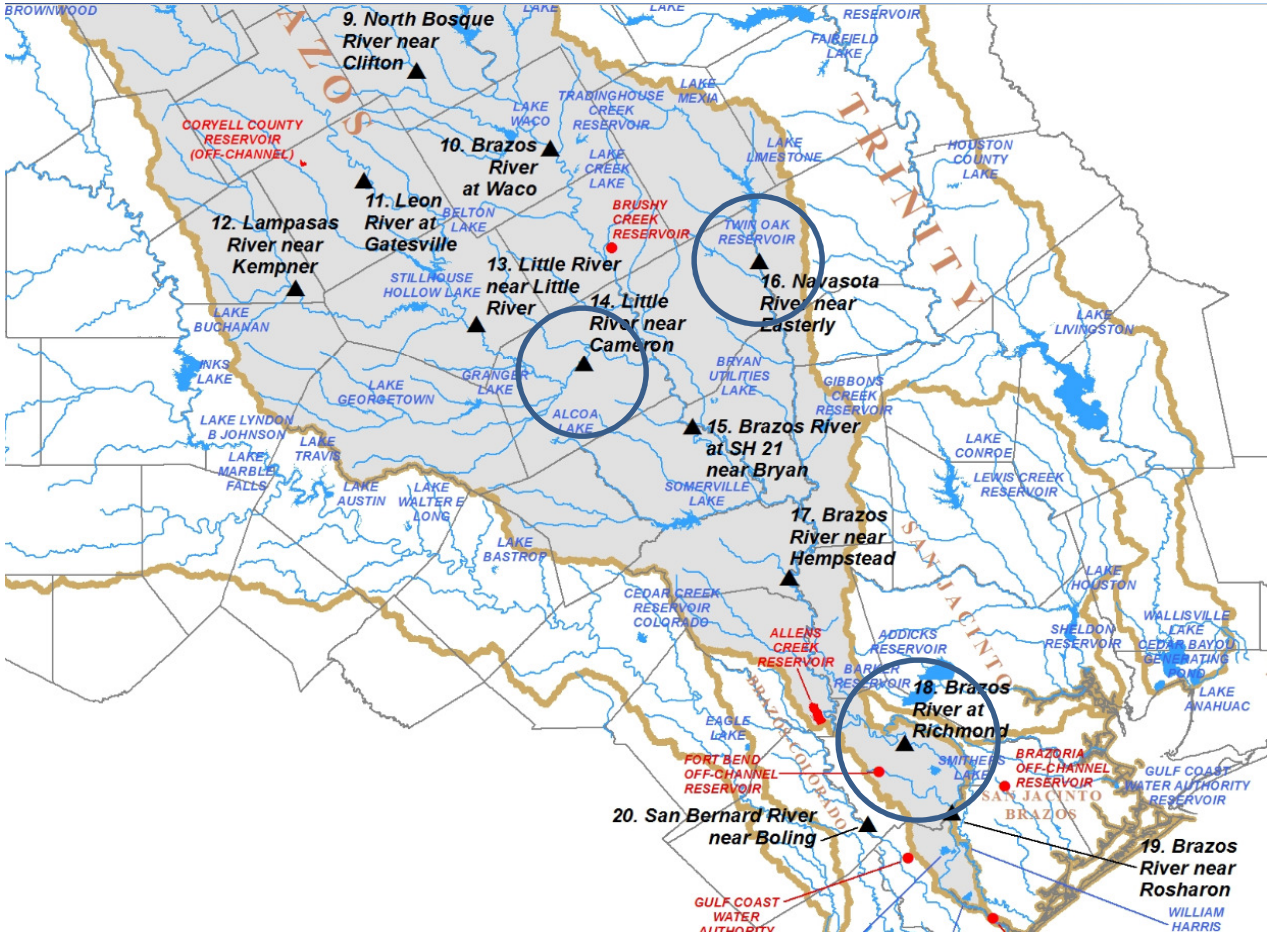
Decline in high flow pulses in segments of the mainstem

Alligator gar in decline throughout most of its range; maintains a low population here.

Freshwater mussel species

Lower Brazos Basin

(below the mouth of the Bosque River to the coast)



14, 16, 18. BRA Systems Operations (SysOps) Permit "full matrix" requirements

On Channel Reservoir:
- Brushy Creek

Off Channel Reservoirs:
- Coryell County
- Allens Creek
- Brazoria
- Fort Bend
- Gulf Coast Water Authority

On-Channel vs. Off-Channel Reservoirs

On-Channel Reservoir

- Physical barrier to fish passage; impingement/entrainment issues with turbines;
- Reservoir foot print impacts to wetland, terrestrial and aquatic habitat; habitat mitigation required;
- Greater impact to instream flow regime (pulses and overbank flows);
- Sediment trapped within reservoir pool.

Off-Channel Reservoir

- No physical barrier to fish passage;
- Reservoir foot print impacts can be reduced by avoiding wetland and other sensitive habitat areas; less habitat mitigation required;
- Less impact to instream flow regime and sediment transport.

TEXAS PARKS & WILDLIFE

Flow alteration impacts: mussels

- Base flow reductions could:
  - reduce available habitat and alter water quality
  - reduced depth could increase predation
  - alter habitat conditions for host fishes or reduce the interaction of the mussel and host fish
  - reduce their ability to extract food from water column
- Pulse flows:
  - too much flow could cause scour or high turbidities (reduces efficient feeding)
  - Out-of-season pulses can disrupt reproduction and recruitment
  - quick recessions can strand mussels on the bank
  - flush fine sediment
- Full flow regimes support diverse fish assemblages which support diverse mussels assemblages (fish serve as hosts for larval stages)

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Brazos River Basin Mussels

Approximately 25 species historically in Brazos Basin

Five listed as state threatened and petitioned for listing as federally endangered

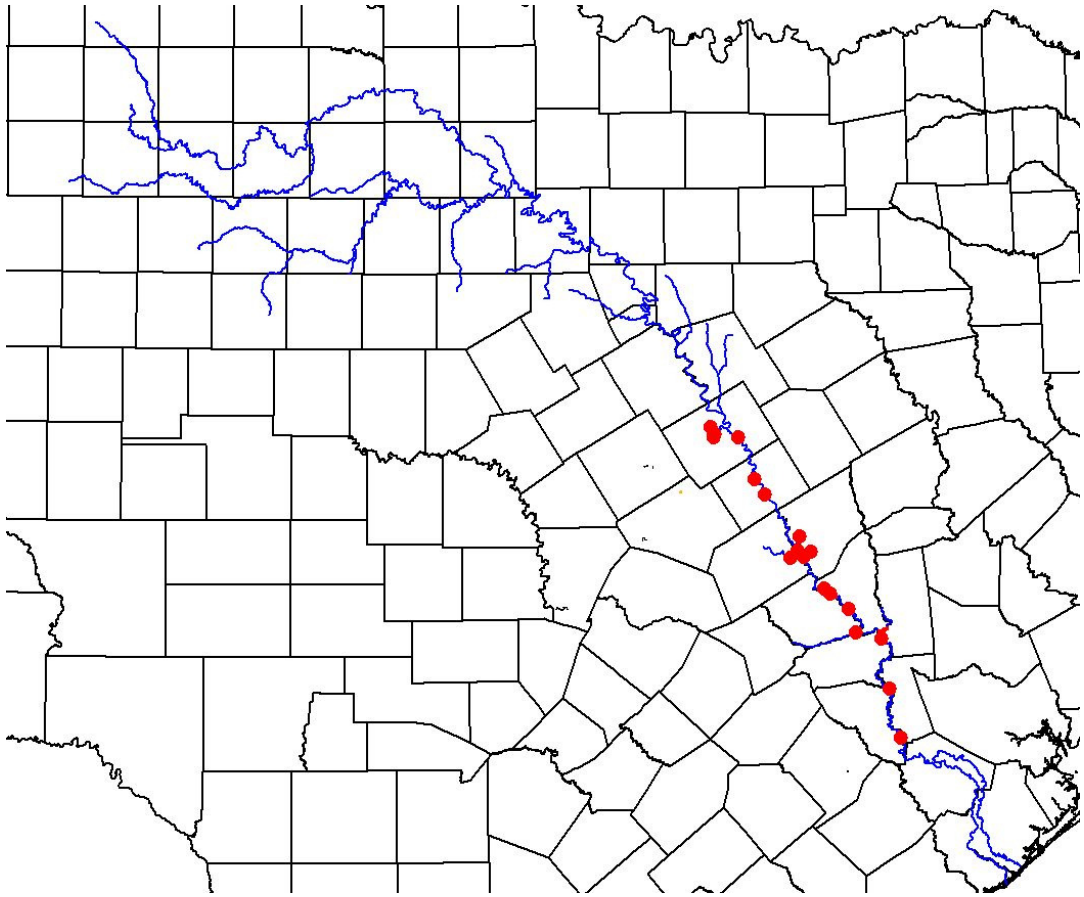
- Smooth Pimpleback
- Texas Fawnsfoot
- Golden Orb – very rare
- Texas Fatmucket – very rare
- False Spike – very rare

TEXAS PARKS & WILDLIFE

Texas Natural Diversity Database (TXNDD)
Known Brazos River Locations for
Smooth Pimpleback (*Quadrula houstonensis*)

Smooth Pimpleback

49 locations



Texas Natural Diversity Database (TXNDD)
Known Brazos River Locations for
Texas Fawnsfoot (*Truncilla macrodon*)

Texas Fawnsfoot

21 locations